SEC-LINE/RECEIVER 2000Xe

Users Manual

Sec-Line/Receiver 2000Xe is a high-level security encryption module for telephone receivers from ARDY Electronics Ltd. This encryption module can be installed to analogue or digital telephones worldwide. The installation is done between the handset and the telephone on the 4-wire receiver cord.

Sec-Line/Receiver 2000Xe uses key fingerprint display that prevents man-in-the-middle attacks with an Optional PIN-based access control possibility.

Sec-Line/Receiver 2000Xe uses Diffie Hellman with 1024 bit PKI handshake to start the secure connection and triple DES as per ANSI specification X9.52 as encryption algorithm with a 168-bit unique random synchronous encryption key negotiated for each call.

Sec-Line/Receiver 2000Xe has to be installed at both sides of the communication in order to establish a secure connection. The unit can be used for both secure and clear phone calls.

Sec-Line/Receiver 2000Xe connects in moments to the handset and offers the following features: Strong Encryption Technology, Clear Voice Quality, One Button Operation, Universal Telephone Compatibility, and Portable.

SLR-2000Xe

Technical Data

Modem: ..... 9600 bps CCITT V.32 full duplex, echo cancelling
Voice encoder:..... ITU G.729 AS-CELP at 8kbps
Connection: .....between handset and telephone
Operation:..... full duplex
AC-power requirements: .....adapter 240 VAC 50Hz/110 VAC 60Hz
DC-power requirements: .....12-16 VDC 600 mA
Internal rechargeable battery:..... 6 Volt 500mAh

Encryption Data

Algorithm: ..... Triple DES as per ANSI specification X9.52
Encryption key length: ..... 168-bit unique, random key
DES Key combinations: ..... 10^{52}
PKI algorithm:..... Diffie-Hellman exponentiation
PKI encryption key length:.....1024 bits
Public Key Exponent:.....256 bits
PKI Key combinations: ..... 10^{308}

Other Data

Temperature range operating: .....0 to 50 C
Temperature range storage: ..... -20 to 75 C
Size:..... 195 x 150 x 50 mm
Weight:..... 0.7 kg
Cover:.....Plastic
Shielding: ..... Option

USERS MANUAL

SLR2000Xe

Sec-Line Receiver 2000Xe

Personal Telephone Security

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CONTENTS

Introduction 6
Overview 6
Parts Checklist 7
Installation and set-up 8
Introduction 8
Installing the SLR2000Xe 8
Configuring the SLR2000Xe 10
Removing the SLR2000Xe 11
Operation 11
Introduction 11
Operating controls 12
Turning on the SLR2000Xe 14
Non-secure calls 14
Securing a call 15
Changing earpiece volume 18
Muting the microphone 19
Enabling PIN-based access control 19
Disabling PIN-based access control 20
Changing the pin 20
Performing a self-test 22
Escaping from a menu 22
Maintenance / troubleshooting 22
Maintenance 22
Troubleshooting 23
Appendix A-telephone compatibility 26
Appendix B-Specifications information 32

FIGURES

Figure 1.SLR2000Xe Operating controls 12

TABLES

Table 1. Troubleshooting guidelines 24
Table 2. Prone type codes 28

1. Introduction

Overview

Congratulations on your purchase of your new personal telephone security device.

The SLR2000Xe has been designed to economically provide convenient and reliable secure voice communications through advanced voice compression and digital techniques.

SLR2000Xe´s small size makes it ideal for use at home, at work or when travelling. Its telephone interface is configurable to allow operation with virtually all telephone handsets.

The voice compression algorithm in the SLR2000Xe provides toll-quality communications between calling parties, making secure calls nearly transparent.

For ease of use, a single pushbutton alternately activates and de-activates the SLR2000Xe secure mode. The display indicates in which mode the SLR2000Xe is operating. In secure mode the light diode on the front is GREEN. In non-secure mode the light diode is RED.

Parts Checklist

Upon unpacking your SLR2000Xe, inspect the contents for damage that may have occurred during shipping. Save all packing material until the unit is installed and working properly. Visually confirm that there are no broken parts and that the SLR2000Xe housing is free of obvious defects. If you suspect that parts are damaged or missing call your local rep.

A complete SLR2000Xe system includes:

1. SLR2000Xe device
2. SLR2000Xe to-telephone interface cord
3. AC Power adapter
4. Users manual

Optional international power adapter 110VAC is available. Please e-mail your local rep for pricing and delivery.

2. Installation and set-up

Introduction

This section provides information for installing your SLR2000Xe, configuring it for your specific telephone type and removing it from your telephone.

Installing the SLR2000Xe

The SLR2000Xe should be used with an approved telephone of good quality. To install your SLR2000Xe follow these steps:

1) Remove the handset cord from the HANDSET jack on your telephone base. DO NOT remove the modular plug from the LINE jack on your telephone. In order to maintain CE compliance for the European Community the coiled handset cord should be limited to a length of less than 3 meters.
2) Plug the supplied interface cord between the SLR2000Xe TELEPHONE jack on the rear of the SLR2000Xe unit and the HANDSET jack on your telephone base.
3) Plug your handset cord into the SLR2000Xe HANDSET jack on the right side of the SLR2000Xe unit.

4) Plug the AC power adapter cord into the SLR2000Xe POWER jack at the rear of the unit. Plug in the AC power adapter into a standard wall outlet (240 VAC, 50 Hz. Option 110 VAC, 60Hz).
5) If the SLR2000Xe is not on, press the **on/off** button at the back side of the SLR2000Xe.
6) The SLR2000Xe will briefly display its current software version number, followed by ”**non-secure mode”.**
7) If ”**self-test failed”** is displayed, contact your local rep.
8) The internal Battery backup is 6 V with 500 mAh which will power the unit for about 1 hour if the main power is lost. On the rear of the SLR2000Xe the light diode will show RED if the battery is not fully charged and GREEN if the battery is fully charged. The internal battery is charging even if the SLR2000Xe unit is turned OFF.

Configuring the SLR2000Xe

To configure the SLR2000Xe for your specific telephone type performs the following steps:

See section 3 operating controls for key descriptions and locations.

1) Turn on the SLR2000Xe by pressing the **on/off** Switch at the rear of the SLR2000Xe.
2) Press the **menu** key.
3) The top line of the display will show ”**select phone”**. Repeated pressing of the **next** key will scroll through the menu selections.
4) Press the **enter** key.
5) Find the four-digit Phone type code associated with your telephone manufacturer and model number in the table in Appendix A. Enter that four-digit number using the **0-9** keys on the SLR2000Xe.

NOTE: You can usually identify your telephones manufacturer and model number on a label or stamp either on the bottom or on the back of the telephone base. If you cannot find the manufacturer or model number of your particular

telephone type, then follow the procedure in Appendix A.

Removing the SLR2000Xe

To remove your SLR2000Xe and restore your telephone to its original configuration, follow these steps:

1) Turn off the SLR2000Xe by pressing the **on/off** switch at the rear of the SLR2000Xe unit.
2) Unplug the SLR2000Xe AC power adapter from the wall outlet. Unplug the AC power adapter cord from the SLR2000Xe POWER jack.
3) Unplug the interface cord from the telephone HANDSET jack and from the SLR2000Xe TELEPHONE jack.
4) Unplug the handset cord from the SLR2000Xe HANDSET jack and plug it into the telephones HANDSET jack.
5) Store the SLR2000Xe, the power adapter and the interface cord and place it in a safe location.

3. Operation

Introduction

This section contains a description of the operation controls and provides operating instructions for the

SLR2000Xe. The basic operations covered in this portion of the manual are:

1) Placing unencrypted telephone calls.
2) Securing a telephone call.
3) Adjusting the earpiece volume while in a Secure call.
4) Muting the microphone while in a secure call.
5) Enabling and disabling the personal identification number (PIN) feature of the SLR2000Xe.
6) Changing your PIN and
7) Performing a self-test on the SLR2000Xe.

Operating controls

The SLR2000Xe has sixteen keys for controlling its operation as follows

Figure 1. SLR2000Xe Operating controls

On/Off Switch at the rear of the unit – turns the SLR2000Xe power on and off.

Menu key – enters and exits the menu display for SLR2000Xe control function.

Next key – scrolls through the available menu selections while in the menu display.

Enter key **–** activates the currently selected menu function.

0-9 key are used for entering the Phone type code and PIN. During a secure call the **0**-key activates muting; the **3**-key lowers the earpiece volume and the **4**-key raises the earpiece volume.

Secure key – when in non-secure mode this key is used to secure a telephone call; when in secure mode this key returns the SLR2000Xe to non-secure mode.

Light Diode on the Secure key. When the unit is in secure mode the light diode is GREEN, when non-secure mode the light diode is RED.

Light Diode on the rear of the unit shows if the internal 6 V battery is fully charged (GREEN) or not (RED).

Turning on the SLR2000Xe

To turn the SLR2000Xe on, push the **ON/OFF** switch at the rear of the unit. The display will show the software version of your SLR2000Xe for approximately one second, after which it will show ”**Non-Secure Mode**”. When the SLR2000Xe is turned on it automatically performs a self-test. If the self-test fails the display will read ”**Self-test failed**”.

Non-secure calls

Non-secure calls can be placed whenever the SLR2000Xe is powered off or when the display read ”**Non-secure mode**”. Secure calls can be placed even in the event of a power failure as the internal battery will power the unit. The SLR2000Xe does not have o be disconnected from your telephone in order to place a non-secure call. When in **Non-Secure mode** the light diode located at the Secure key will show RED colour.

Securing a call

To place a secure call, follow these steps:

1. Pick-up your telephones handset and dial your phone number normally. Make sure that your SLR2000Xe is turned on and displaying **"Non-secure Mode"**. Next, ensure that the far-end party has a SLR2000Xe connected to his/her phone and that their SLR2000Xe is also powered on. Hands free calls from your phone can not be done in secure mode.

2. Set your telephones handset volume control if present o its normal (middle) position.

3. Agree on which one of you will press the **Secure** key to initiate secure mode.
   Important: Only one party may initiate secure mode.

4. To enter secure mode, press the **secure**-key on the SLR2000Xe. If the far-end party is the initiator, you should not press the **secure**-key. If PIN-based access control is enabled, enter your 4-digit PIN when requested. The display will show how, in sequence, these messages:
   "Establishing connection,
   "Training secure modem" and

”Exchanging Key Parameters” to indicate the status of the security establishment process. Voice communications will be blocked while the SLR2000Xe is securing your phone call.

5. After 8 to 15 seconds the top line of the SLR2000Xe display will change to ”**secure mode”.** This indicates that the call is secured. The light diode placed at the Secure key will in **Secure mode** show GREEN colour. The bottom line of the display will change to ”**key print**” followed by a 5-digit key fingerprint number. Verify that this number appears.

6. Ask the far-end party to read the 5-digit key fingerprint displayed on their SLR2000Xe. If their key-fingerprint number is the same as yours, then the call is secured. If the key fingerprints are not identical, press the **Secure**-key and repeat steps 3 through 6.If the key-fingerprints continue to differ from each other, then your call is most likely under a cryptographic attack by a malicious third party and your privacy my be compromised. If you find yourself in this situation, you and the far-end party should both attempt to move to different locations before trying to place another secure call.

7. To return to non-secure mode **one** party must press the **Secure**-key (this need not be the same party that initiated the transition to secure mode). The other party will then be alerted by the presence of a non-secure warning tone (3 beeps in rapid succession). The SLR2000Xe will briefly display a message indicating that it is transitioning to non-secure mode. When the transition is complete, the display will read, ”**Non-secure mode**”.

Occasionally, drastic changes in telephone line conditions can occur during a typical phone call. If this happens the SLR2000Xe my not be able to maintain line security, in which case it will alert both users with a non-secure warning tone (3 beeps in rapid succession) and briefly display ”**signal lost going non-secure**” before reverting to non-secure mode.
At this point steps 3 through 7 should be repeated in order to re-establish security.

NOTES:
To prevent the interruption of call security described above, observe the following restrictions when attempting to activate or operate the SLR2000Xe in secure mode:

- Do not modify the volume setting on your telephone. Use the SLR2000Xe **3** (VOL-) and **4** (VOL+) keys to adjust volume.

- Do not use the mute switch on your telephone. Use the SLR2000Xe **0 (MUTE)** key to mute your microphone.

- Do not use the speakerphone on your telephone.

- Do not press any dialling keys on your telephone.

- Do not place the secure call on hold.

- Do not pick up an extension on the same line.

Changing Earpiece Volume.

To decrease the earpiece (receiver) volume of a secure call, press the **3** (VOL-) key.
To increase the earpiece (receiver) volume of a secure call, press the **4**(VOL+) key. During volume adjustment, the SLR2000Xe will display a bar graph indicating the current volume setting. These settings only apply when the SLR2000Xe is operating in secure mode and are retained even after power is removed. As a general rule use the

volume controls on your telephone during a normal non-secure conversation and the volume controls on your SLR2000Xe during a secure conversation.

Muting the microphone.

If you wish to mute your microphone during a secure call press the **0** (MUTE) key. The display will read, ”***Muted***” and the far-end party will not be able to hear you. To return to normal operation, press the **0** (MUTE) key again. The display will return to the normal secure mode display. As a general rule, use the mute control on your telephone during a normal non-secure conversation and mute control on your SLR2000Xe during a secure conversation.

Enabling PIN-based access control.

The SLR2000Xe can be configured to require the entry of a 4-digit personal identification number (PIN) prior to enabling secure communications. To enable this feature, press the **MENU** key, than repeatedly push the **NEXT** key until the top line of the display reads,” -> **PIN ENABLE**”. Now press the **ENTER** key and type in the four digit PIN you

wish to use via the **0-9** keys. You will be asked to repeat the new PIN to insure correctness.

WARNING: THERE IS NO WAY TO RESTORE OPERATION IF YOU FORGET YOUR PIN! IT IS STRONGLY RECOMMENDED THAT YOU WRITE DOWN YOUR SELECTED PIN AND KEEP IT IN A SAFE PLACE, AWAY FROM YOUR SLR2000Xe.

Disabling PIN-based access control.

PIN-based access control can be disabled again via the menu. To disable PIN access, press the **MENU** key, then repeatedly push the **NEXT** key until the top line to the display reads, ” **PIN DISABLE”.** Now press the **ENTER** key and type in your four digit PIN to authorize the request. If the PIN you enter is not correct, PIN-based access control will remain enabled.

Changing the PIN

If PIN-based access control is enabled, you can change your four-digit PIN to a new value. To change the PIN, press the **MENU** key, then repeatedly push the **NEXT** key until the display reads, ”**-> CHANGE PIN.”** Press the **ENTER** key

and type in the old PIN for authorization, then type in the new four-digit PIN you wish to use using the **0-9** keys. You will repeat the new PIN to ensure correctness.

WARNING: THERE IS NO WAY TO RESTORE OPERATION IF YOU FORGET YOUR PIN! IT IS STRONGLY RECOMMENDED THAT YOU WRITE DOWN YOUR SELECTED PIN AND KEEP IT IN A SAFE PLACE AWAY FROM YOUR SLR2000Xe.

Performing a Self-Test

Your SLR2000Xe automatically performs a self-test whenever it is powered on. A self-test can also be activated via the menu in non-secure mode. To perform this self-test, press the **MENU** pushbutton, then repeatedly push the **NEXT** key until the top line of the display reads, "**-> SELF TEST**." Next, press the **ENTER** key. After a few seconds the display will present he results of the self-test. If the self test fails, contact your local rep.

Escaping from a menu

If you enter the SLR2000Xe menu system and do not wish to activate any of the menu selections, pressing the **MENU** key again will return the SLR2000Xe to normal operation.

4. Maintenance/troubleshooting

Maintenance

The only maintenance that the SLR2000Xe requires is periodic cleaning of the display and exterior surfaces. These surfaces may be cleaned using a non-abrasive cleaner and a soft lint-free cloth. Do not apply cleaner directly to the

SLR2000Xe surfaces but rather apply cleaner to the cloth and then wipe the SLR2000Xe.

Troubleshooting

Your SLR2000Xe has been designed and manufactured to provide years of trouble-free operation. If a problem develops during a secure call, it can usually be resolved by pressing the **Secure-**key and re-initiating the secure call.

When either party presses the **Secure-**key to enter non-secure mode, the other party will be alerted by the presence of a non-secure warning tone (3 beeps in rapid secession). This ensures that both parties are aware that the call is no longer secured. The display will briefly indicate that a transition to non-secure mode is in progress and will read "**Non-secure-mode**" and the light diode at the ,Secure–key will show RED colour when this transition is complete.

If you experience problem with your SLR2000Xe, re-check all connections and attempt operation again. If the problem persists, call your local rep. Table 1 provides additional troubleshooting guidelines.

Table 1. Troubleshooting Guidelines

Problem	Possible Cause
The display remain blank	1.The power is off 2.Power adaptor is not plugged into AC outlet 3. Power cord is not connected to the unit
SLR2000Xe is not able to secure your call.	1.The phone volume settings are set to high. 2. Another phone is installed to the same line is in use. 3.The phone code is incorrect. Check the settings using the table in Appendix A 4.The phone connection is poor quality, place the call again. 5. Both parties are attempting to initialize secure mode. 6.Your phone is cordless or has a switch in the handset.
Far end party can not hear you during a secure call	1.The mute function is activated. Press 0 mute key. 2.The far end party’s

	earpiece volume is set too low 3.The SLR2000Xe phone type cord is incorrect. 4.The two party’s don’t use the same SLR2000Xe system.

Earpiece volume is too low	1.The earpiece volume is not adjusted 2.The far-end party's code is incorrect, see table for change of codes.
Earpiece volume is too high	1.The earpiece volume is not adjusted correct. 2.The far-end party's code is incorrect, see table for change of codes.
Secure speech sounds noisy or raspy	1.The earpiece volume is adjusted to high 2.The far-end party's code is incorrect, see table for change of codes.
Self test Failure	Turn OFF the unit on the rear of the SLR2000Xe and turn it on again. If this problem remain please contact your local rep.

APPENDIX A – TELEPHONE COMPATIBILITY

Your SLR2000Xe is designed to work with a wide variety of existing telephones. It can be custom-tailored to the characteristics of your specific

phone by entering a Phone type code into SLR2000Xe during installation. Table 2 provides the Phone type for a wide variety of popular telephone models. The latest listing is available at the www.ardyelectronics.com website.

NOTE: You can usually identify your telephones manufacturer and model number on a label or stamp either on the bottom or on the back of the telephone base.
If you cannot find the manufacturer or model number of your particular telephone or the manufacturer/model is not listed in table 2, try the default Phone Type ”**1285**”. If you are unable to complete a secure call with this Phone Type, you may want to try some or all o the following settings: ”**0685,**” ”**0985**,” ”**1185,**” ” **1385**, ”**1585**,”**1885**” and ”**2185**”. If none of these settings work, contact the local rep.

For assistance configuring the SLR2000Xe for your telephone, call your local rep.

Table 2. Phone Type Codes.

Manufacturer	Model	Codes
Alcatel	4000 series	1185
Alcatel	22412MASP	1185
	2410MA	1185
	2140MA	1185
	2112MA	1185
	4012 Reflex	1185
Alcatel Telstra	Com,HX Series	0487
Asctel	200 ASC com	0985
British Telecom	Converse 250	1285
Brothers fax	275	1185
Comdial	2500	2283
	Digitech	1184
	Impact Series	1285
DuoFone	8800	0985
Dutch PTT VOX	Dialog32.11	0885
Ericsson	MD110	1085
Escort	EKC plus 2	0487
Fujitsu	Digital 53	0985
	SRS10xx Series	0885
	SRS-2100	0885
	SRS99xx Series	0985
GE	2-9315A	1285
General Electric	2-9320A	1185
	2-9339A	1285
	2-9438B	1285
	2-9450D	1085

Hitachi Busine.	HIT-1	1185
IBX	ITE12S	1785
InterTel	55.4500	1285
Isotec	Executive	1085
ITT	2500	2082
	2500 44	2282
Lenox Sound	HAC PH-318	1885
Lucent / AT&T	100	0985
	1527	1385
	1532	1385
	1872	1285
	2500MMGM	1485
	2500YMGM	1285
	4400 Series	1385
	6400 Series	1285
	6500 Series	1385
	700 Series	1185
	7300 Series	1691
	7400 Series	1691
	7500 Series	1692
	8100 Series	0985
	8400 Series	1285
	8400 Series	1385
	906	1085
	930	1285
	954	1085
	960	1385
	970	1485
	AT101M	1085

	I-2120	1185
	Index DT3	0685
	MLS-12	1285
	MLX Series	1385
	NI-35T	1585
	Partner 18D	0785
	Partner 18D	0485
Matra	MC600 Series	1085
NEC	D term Series E	1185
	D term Series20	0587
Nitsuko Am		1385
Nortel	Astra	0985
	M2000 series	1085
	M2600 Series	1485
	M3900 Series	1385
	M5317T	1585
	Mer 7000 series	1585
	Mer 5000 series	1585
	Mer 8002 series	0785
	Mer 8300 series	1085
	Mer 9000 series	1085
	Norstar7000	1384
	NT1	1285
	QSOM2500	2282
	Rapport	0885
	SL1 QSU60	2083
	Venture	0685
Oki	SR digital key	1185
Panasonic	KXFM131	1285

	KX-T2310	1385
	KX-T2355	1385
	KX-T2365	1385
	KX-T3155	1185
	KX-T7000 SER	1184
	KX-T7030	1184
	KX-T7030	1285
	KX-T7420	1384
	KX-TS17L	1285
	KX-TS20	1385
	KX-TSC12W	1185
	VB43225	1585
	VB44225	1285
Phillips	EXect.SOPHO	0985
Premier	EDEVT	1385
Rolm	240	0586
	400	0786
	64000	0586
Samsung	DS24E	0586
	ProStar LCD12	0786
Siemens	Euroset8x5	1085
	Gigaset2420	1385
	Optiset E ser	1085
	Optiset N1200u	1285
Sony	IT-B3	0983
	IT-B9	0985
	IT-ID-80	0985
	IT-M11	0785
South west bell	CT101	1185

	Freedom	1185
Stromberg	2500	2284
Taderain	Coral	1285
Teleconcepts	TMX200	1183
Teledex	Diamond Ser	1085
Telematrix	Marquee 2702	1285
Telenordic	-	0885
TMC	HACM4000	1185
	M4810	1185
Tone Command	6200 Ser	0885
Toshiba	DKT-2010	0885
Vodavi	Infinity DVX	1585
	Star +2	0985
Western Electr	2500DM	1885
	2500MM	2183

APPENDIX B - SPECIFICATIONS

Security Features

Traffic Algorithm:

Triple DES as per ANSI specification X9.52

Traffic key :

168-bit unique, random key negotiated for each call

Public key algorithm:

Diffie-Hellman exponentiation.

Public key modulus:
1024 bits

Public key exponent:
256 bits.

Key fingerprint display prevents man-in-the-middle attacks Optional PIN-based access control.

Modem
9600 bps CCITT V.32 full duplex, echo cancelling.

Vocoder
ITU G.729 ASA-Celp at 8kbps

Physical characteristics
195mm x 150mm x 50 mm 0.61 kg

Environmental
Operating temperature: 10 gr C to 40 gr C
Storage temperature: -20 gr C to 50 gr C
Humidity: 10-95% non-condensing.

Power
Wall mount power adapter
240VAC, 50 Hz
Power dissipation < 6 watts
Optional wall mount international power adapter

115VAC, 60 Hz
Internal Battery 6 V rechargeable.

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